UNITED STATES ENVIRONMENTAL PROTECTION AGENCY - REGION III
OFFICE OF ANALYTICAL SERVICES AND QUALITY ASSURANCE
Environmental Science Center
701 Mapes Road
Fort Meade, Maryland 20755-5350

DATE: August 22, 2007

SUBJECT: Pennsylvania Storage Tank Corrective Action Program
Quality Assurance Project Plan (QAPP) (QA Doc.#27131)

FROM: Mary Ellen Schultz, Environmental Scientist MCS
OASQA/Technical Services Branch (3EA22)

TO: Carletta Parlin, Project Officer
RCRA (3WC21)

Pursuant to your request, I have reviewed Pennsylvania Storage Tank Corrective Action Program, Quality Assurance Project Plan (QAPP) dated June 28, 2007. This document was revised per comments in Cynthia Caporale's January 6, 2003-memo. Comments were adequately addressed and I recommend approving the QAPP.

If you have any questions, please contact me at (410) 305-2746.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Mr. Kenneth Reisinger
Director, Bureau of Waste Management
Rachel Carson State Office Building
P.O. Box 8471
Harrisburg, PA 17105-8471

Dear Mr. Reisinger:

The U.S. Environmental Protection Agency (EPA), Region III, Waste and Chemicals Management Division (WCMD) is pleased to notify you of its approval of the Pennsylvania Department of Environmental Protection's Quality Assurance Project Plan for Storage Tanks Corrective Action Program dated June 28, 2007. Enclosed is the approval signed by Thomas UyBarreta, EPA Project Manager. The plan has been reviewed and approved by Mary Ellen Schultz of the EPA Office of Analytical Services and Quality Assurance/Technical Services Branch and David Friedman, WCMD's Quality Assurance Officer.

EPA appreciates your cooperation in finalizing this document. If you have any questions for the RCRA State Programs Branch, please contact me at 215-814-3444 or pizarro.luis@epa.gov, or Thomas UyBarreta at 215-814-2953 or uybarreta.thomas@epa.gov.

Sincerely,

Luis A. Pizarro, Chief
RCRA State Programs Branch

Enclosure

cc: M.E. Schultz (3EA20)
D. Friedman (3WC11)
T. UyBarreta (3WC21)

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Title and Approval Page

Document Title: Quality Assurance Project Plan for the Storage Tanks Corrective Action Program

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Date: June 28, 2007

State Program Director _____ **Date** 9/9/07
Kenneth Reisinger
Director, Bureau of Waste Management

USEPA Project Manager _____ **Date** 8/24/07

Quality Assurance Project Plan

for the

Storage Tanks Corrective Action Program

June 28, 2007

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Director, Bureau of Waste Management

USEPA Project Manager_____ **Date**_____

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Introduction

The PA Department of Environmental Protection (DEP or Department) Storage Tank Corrective Action Program is responsible for ensuring that human health and the environment are protected from releases of hazardous substances and petroleum products from underground and aboveground storage tank systems.

The *Storage Tank and Spill Prevention Act* (Act 32) of 1989 provided for the regulation of storage tanks and tank facilities in Pennsylvania by the Department of Environmental Protection. It authorized the Department to take corrective action, order that a corrective action be undertaken, or to authorize a third party to take corrective action to remediate releases from underground or aboveground storage tank systems. Regulations covering the corrective action process for leaking underground storage tanks were first promulgated on August 21, 1993 and were later revised on December 1, 2001. 25 PA Code Chapter 245 *Administration of the Storage Tank and Spill Prevention Program* details the corrective action process for owners and operators of storage tank facilities and other responsible parties. The *Land Recycling and Environmental Remediation Standards Act* (Act 2) of 1995 established cleanup levels and liability protection for releases from storage tanks regulated under Act 32.

This Quality Assurance Project Plan (QAPP) describes the quality assurance requirements for environmental data collection activities conducted under the Storage Tank Corrective Action Program in Pennsylvania.

A. Project Management

A.1 Program Description

The DEP Storage Tanks Corrective Action Program (STCAP) is responsible for ensuring the protection of human health and the environment from releases of hazardous substances or petroleum products to the environment from underground or aboveground storage tank systems.

Storage tank owners, operators, and other responsible parties who experience releases from storage tank systems regulated under Act 32 are required to take corrective action to remediate releases in accordance with 25 PA Code Chapter 245 *Administration of the Storage Tank and Spill Prevention Program* (*Tank Regulations*). These regulations adopted by reference, the Federal closure regulation found in 40 CFR Part 280, Subpart G. These responsible party, or RP lead, sites account for the majority of storage tank corrective actions taken in Pennsylvania. A flow chart describing the corrective action process for RP lead sites may be found in the DEP *Closure Requirements for Underground Storage Tank Systems Technical Guidance Document* (April 1998).

In certain cases, DEP may take the lead in investigating and remediating releases from underground or aboveground storage tank systems. Such cases may occur when:

- The response is an emergency action.
- The responsible party cannot be identified.
- The responsible party is financially insolvent.
- The responsible party fails to comply with an administrative order or court action.

These sites are deemed State lead cleanup actions and DEP, or its contractors, may perform the site assessment and cleanup.

Environmental data generated by Department staff or third parties acting on behalf of the Department will adhere to the QAPP. DEP may also require that responsible parties or responsible party contractors adhere to applicable provisions of the QAPP.

Owners, operators, or other responsible parties who wish to take an underground storage tank out of service and/or remove an underground storage tank are required to follow the *Closure Requirements for Underground Storage Tank Systems Technical Guidance Document (Closure Guidance).* The *Closure Guidance* provides a detailed explanation of Chapter 245.451 through 245.455 for out-of-service underground storage tank systems and closure. The guidance refers to the corrective action requirements in Chapter 245, Subchapter D, if a release is discovered from an underground storage tank during the closure process.

A.2 Program Organization and Responsibility

The Storage Tank Section of the Environmental Cleanup Program in each of the six DEP regional offices is responsible for implementing the storage tank corrective action program in their respective region. Regional office staff are involved in responding to complaints from persons affected by releases from storage tanks, overseeing and tracking the status of responsible party-lead cleanups, and taking and overseeing state-lead cleanup actions. The Storage Tanks and Hazardous Sites Corrective Action Section in the DEP Central Office is responsible for coordination of the program statewide and for the long-term planning efforts of the program.

Director, Bureau of Waste Management
The Director of the Bureau of Waste Management has the overall responsibility for developing and revising the Quality Assurance Project Plan for the Storage Tank Corrective Action Program.

Chief, Storage Tanks and Hazardous Sites Corrective Action Section
The Chief of the Storage Tanks and Hazardous Sites Corrective Action Program in Central Office is responsible for the overall coordination of the Storage Tanks Corrective Action Program. The Chief of Storage Tanks and Hazardous Sites Corrective Action Program oversees the development of all guidance documents, policies and procedures, and standard operating procedures relating to the program.

Chief, Remediation Contracts Management Section
The Chief of the Remediation Contracts Management Section in Central Office coordinates and oversees the contracts for remediation services for State-lead storage tank cleanup actions.

Regional Director
The Regional Director in each DEP Regional Office has the responsibility for ensuring that the QAPP for each program in their region is effectively implemented.

Regional Environmental Cleanup Program Manager (ECP Manager)
The Environmental Cleanup Program Manager in each DEP Regional Office is responsible for overall QA for environmental cleanup program activities in their respective region. This includes the Storage Tanks Corrective Action Program. The ECP Manager is responsible for ensuring that all CAP activities that generate data are done in accordance with the program QAPP.

Regional Storage Tanks Section Chief
The Regional Storage Tanks Section Chief oversees the Quality Assurance (QA) activities of the Regional Project Officers (RPOs) in the Storage Tanks Section.

Regional Project Officer (RPO)
The Regional Project Officer is responsible for quality assurance at assigned STCAP sites. The RPO will oversee the activities of responsible party contractors, state lead contractors, and DEP staff to ensure adherence to program protocols at assigned corrective action sites. The RPO reports to the Storage Tanks Section Chief, who oversees the activities of the RPOs involved in the STCAP.

Remedial Contractor Onsite Project Manager
If a DEP contractor is used, the DEP Contractor Onsite Project Manager will be responsible for coordinating all aspects of a site-specific project with the RPO. The DEP Contractor Onsite Project Manager reports to the RPO. A list of current DEP remedial contractors is included as Appendix A. This list is subject to change.

Laboratory Analyses
DEP and its contractors will use laboratories accredited in the analytical methods, matrices and parameters required in accordance with the *Environmental Laboratories Accreditation Act* (Act 90) of 2002. DEP will also require that responsible parties and their contractors use accredited laboratories. DEP currently utilizes the services of several laboratories for State lead cleanup actions. A list of DEP laboratories is included as Appendix B. This list is subject to change.

The organizational chart in Appendix C describes the program organization and communication.

A.3 Quality Objectives and Criteria for Measurement Data

Data collected from the Storage Tank Corrective Action Program will be used to:

Determine if there is a threat to human health or the environment.
Locate and identify potential sources of contamination.
Determine the extent of contamination.
Formulate remedial strategies.
Estimate remediation costs.
Determine treatment and disposal options.
Characterize soil and sediments for onsite or offsite treatment.
Characterize surface and groundwater for treatment.
Verify attainment of cleanup goals.
Ascertain if additional remediation is required.
Identify responsible parties.

When applicable, the Data Quality Objectives (DQO) process outlined in EPA QA/G-4 Guidance for the Data Quality Objectives Process will be followed by the CAP. Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of environmental monitoring data required to support decisions. DQOs are predicated in accordance with the anticipated end uses of the data that are to be collected. DQOs are applicable to phases and aspects of the data collection process including site investigation, design, construction, and remedy operations. It is important to note that the level of detail and data quality needed will vary with the intended use of the data. The DQO process consists of the following seven steps:

- Step 1 State the Problem -The problem will be concisely summarized, with prior studies and existing information reviewed.
- Step 2 Identify the Decision - The decision to be made based on the environmental data collected will be identified.
- Step 3 Identify Inputs to the decision - The information needed to make the decision will be identified.
- Step 4 Define the Boundaries of the Study - The time periods and area of study will be identified, including when and where data will be collected.
- Step 5 Develop a Decision Rule - The specific action levels and parameters of interest will be defined and integrated with the previous DQO outputs to describe a logical basis for choosing an appropriate action based on the results.
- Step 6 Specify Limits on Decision Errors - The acceptable decision error rate based on the possible consequences of making an incorrect decision will be established.
- Step 7 Optimize the Design for Obtaining Data - The information from the previous steps will be evaluated to generate alternative data collection designs to meet and satisfy the DQOs in the most efficient manner.

This process will be used for the following activities:

Determine if there is a threat to human health or the environment.
Locate and identify potential sources of contamination.
Determine the extent of impact of contamination.
Determine long-term and short-term risks to human health or the environment.
Identify potential remediation strategies.
Determine if cleanup goals have been achieved.
Determine treatment and disposal options.

When the DQO process is used, site-specific Data Quality Objectives and measurement performance criteria will be included in a Sampling and Analysis Plan (SAP). Prior to the initiation of these types of data activities, a site-specific SAP will be prepared. The SAP will:

- Logically evaluate available site information.
- Specify site-specific Measurement Quality Objectives for precision, accuracy and completeness for each parameter being measured.
- Select an appropriate sampling design.
- Select and utilize suitable geophysical, analytical screening, and sampling techniques.
- Employ proper sample collection and preservation techniques.
- Collect and analyze appropriate quality assurance/quality control (QA/QC) samples.
- Logically present and interpret analytical and geophysical data.
- Define data usability criteria.

A.4 Special Training Requirements/Certifications

All DEP staff and DEP contractors who collect samples from potentially contaminated environmental media are required to complete the OSHA 40-Hour Hazardous Waste Operations certification and to maintain their certification by completing the annual 8-hour Refresher course.

Individuals involved in tank handling activities must hold DEP certification or be supervised by a DEP-certified installer as required by the *Tank Regulations*. Requirements for certification may be found on the DEP website at www.dep.state.pa.us, keyword "Storage Tanks."

B. Measurement/Data Acquisition

All environmental and quality control samples will be collected in accordance with EPA and DEP guidance and described in the site-specific Sampling and Analysis Plan (SAP).

B.1 Sampling Methods Requirements

The purpose of sample collection is to determine the presence of contaminants, the extent to which they have become integrated into the surrounding environment, and to ensure that cleanup goals have been attained. The objective of this effort is to collect and analyze a sample that is representative of the environmental media under investigation. The methods and equipment used for sampling environmental matrices vary with the associated physical and chemical properties. For each anticipated sampling medium (surface water, groundwater, soil, air, waste, etc.) the sampling procedures to be used are described in the site-specific SAP. The specific sampling equipment, decontamination procedures, sample collection techniques and sample preservation procedures are also described in the SAP. RP lead corrective actions must follow the sampling requirements and procedures found in the *Tank Regulations*. Owners, operators, or other responsible parties who take action to remove an underground storage tank and/or take an underground storage tank out of service should follow the requirements and procedures found in the *Closure Guidance*. RP lead corrective actions seeking liability protection under Act 2 must meet the requirements found in Act 2 and the DEP *Land Recycling Program Technical Guidance Manual* (June 2002).

The following documents provide additional requirements for sampling and may be used for developing site-specific SAPs.

- U.S. EPA Office of Solid Waste and Emergency Response. January 1991. *Compendium of Environmental Response Team (ERT) Surface Water and Sediment Sampling Procedures*. EPA/540/P-91/005.

- U.S. EPA Office of Solid Waste and Emergency Response. January 1991. *Compendium of ERT Groundwater Sampling Procedures*. EPA/540/P-91-007.

- U.S. EPA Office of Solid Waste and Emergency Response. January 1991. *Compendium of ERT Soil Sampling and Surface Geophysics Procedures*. EPA/540/P-91/006.

- U.S. EPA Office of Emergency and Remedial Response. December 1995. *U.S. EPA Superfund Program Representative Sampling Guidance, Volume 1: Soil.* OSWER Directive 9360.4-10, Interim Final, EPA/540/R-95/141.

- U.S. EPA Office of Emergency and Remedial Response. December 1995. *Superfund Program Representative Sampling Guidance, Volume 5: Water and Sediment, Part 1 - Surface Water and Sediment*. OSWER Directive 9360.4-16, Interim Final.

- U.S. EPA Office of Emergency and Remedial Response. December 1995. *Superfund Program Representative Sampling Guidance, Volume 5: Water and Sediment, Part II - Ground Water*. OSWER Directive 9360.4-16, Interim Final.

- U.S. EPA Guidance for Representative Sampling. OSWER Directives 9360.4-10 and 9360.4-16, December 1995.

- PA DEP *Groundwater Monitoring Guidance Manual*; PA DEP, Dec. 2001. www.dep.state.pa.us, keyword "Groundwater Protection."

- PA DEP *Guidance on Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard;* PA DEP, January 2004. www.dep.state.pa.us, keyword "Land Recycling."

All possible methods and procedures cannot be described in this generic QAPP. Descriptions of site-specific sampling methods and procedures will be included in the site-specific SAP. Therefore, a general set of media-specific sampling considerations are discussed below.

Soil
Chemical characteristics of soil depend upon its physical characteristics. Typical soil profiles include zones characterized by leaching or precipitation of dissolved cations. Variations in the soil profile should be considered when developing the project-specific SAP, as these factors influence the amount of contaminants a particular vertical section of the soil may absorb.

Surface Water
Surface water samples must take into consideration the physical characteristics of the receiving water as well as the physical characteristics of the potential contaminants. High molecular weight compounds tend to sink and stratify in a "deep" body of water. When contamination from dense, immiscible, liquids is possible, sampling must be near the bottom of the water body and in an area receiving direct discharge from the facility. Sampling for more volatile compounds should be nearer the surface of the water, but not in the upper few inches. The upper water surface is characterized by oxygenation and degassing and will not reflect appropriate ambient conditions. The differences in physical regime between quiet (non-flowing) surface water bodies and flowing surface water must be considered in developing sampling locations.

Sediments
The transport of waterborne sediments is proportional to the velocity and volume of the body of water. The physical characteristics of the analytes determine which fraction of sediments in the body of water to sample. When analyzing for the lighter organic compounds, it is more probable to find them in the finer grained portions of the body of water because finer grained sediments typically have a higher content of carbon constituents which preferentially adsorb the organic compounds, and the depositional regime is generally a quieter water environment, i.e., less agitation and volatilization. Additionally, sampling for analytes with high specific gravity has a better chance for success if done in a channel depositional area, which tends to remove the lighter fractions.

It is important to select a sampling location, which represents the depositional environment where the analytes in question are found. Sedimentation is not uniform or random; therefore, uniformly spaced or random sampling is not necessarily appropriate. Samples obtained from areas in the depositional regime are most likely to contain hazardous substances being released from the site.

Groundwater

It is challenging to obtain truly representative ground water samples. The location and construction of the monitoring well or direct-push wells is a controllable variable in most cases. Assuming that the well is appropriately sited and suitably constructed, it is necessary to sample water that is representative of ambient conditions in the aquifer. A summary evaluation of existing well conditions is included in the project-specific SAP. Well evacuation techniques used prior to collecting a sample assure that the ground water sampled is representative of the formation.

See also the DEP *Groundwater Monitoring Guidance Manual*, PA DEP, (Dec. 2001).

Soil Gas

Soil gas samples are collected to evaluate the potential impact of environmental contamination on indoor air. The choice of sampling locations is critical to obtaining useable data. Other critical considerations include environmental conditions (such as soil moisture content, barometric pressure) at the time of sampling, as well as sampling protocols used. The project-specific SAP includes a description of the methodology used to collect samples

See also the DEP *Guidance on Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard,* (Jan. 2004).

Disposable, ~~and~~ non-permeable, and inert equipment is used as appropriate. When disposable equipment cannot be used, sampling equipment is decontaminated in a manner so as to remove contaminants to below detection limits of the analytical method being employed for analysis to avoid cross-contamination.

Investigation Derived Waste

Any wastes generated during the site investigation will be handled in accordance with the Office of Emergency and Remedial Response Directive 9345.3-02, *Management of Investigation-Derived Wastes During Site Inspections,* (May 1991.) Specifically, investigation-derived wastes (IDW) generated during the site investigation—which may include soil, ground water, used personal protective equipment, decontamination fluids and/or disposable sampling equipment—is managed in accordance with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable.

B.2 Sample Handling and Custody Requirements

Sample containers should be described, prepared, and preserved in accordance with the analytical method. Sample labels will be securely affixed to each sample container. Sample labels will clearly identify the particular sample, and delineate the following information:

- Site name and designated project number.
- Sample identification number.
- Date and time the sample was collected.
- Sample preservation method.
- Sample pH.
- Analysis requested.
- Sampling location.

All samples will be maintained in accordance with the following chain of custody procedures. A sample is under custody when it is:

- In a person's physical possession
- In view of that person after he/she has taken possession
- Secured by that person so that no one can tamper with the sample
- Secured by that person in an area that is restricted to authorized personnel.

A chain-of-custody record must always be maintained from the time of sample collection until final deposition. A sample chain of custody form is attached as Appendix D. Every transfer of custody will be noted and signed for with a copy of the record being kept for each individual that endorsed it. At a minimum, the chain-of-custody record will include the following information:

- Contractor or agency name and address as appropriate.
- Sample identification number.
- Sample location.
- Sample collection date and time.
- Sample information, i.e., matrix, number of bottles collected, container type, etc.
- Names and signatures of samplers.
- Signatures of all individuals who have had custody of the samples.

When preparing sample containers for shipment they will be securely sealed. The custody seals will be used to demonstrate that a sample container has not been opened or tampered with. The individual who has sample custody shall always sign, date, and affix the custody seal to the sample container in such a manner that it cannot be opened unless it is broken. When samples are not under direct control of the individual responsible for them, they will be stored in a container, which will be affixed with a custody seal.

Samples will then be placed in an appropriate transport container and packed with an appropriate absorbent material such as vermiculite. All sample containers will be packed to maintain a temperature of 4 °C as appropriate. A temperature blank will be added to each transport container. When the transport container is received in the laboratory, the laboratory sample custodian will use this container of water to measure the temperature within the transport container. All sample documentation will then be affixed to the underside of each transport container lid. The transport container lid will then be closed and affixed with a custody seal accordingly. Samplers will transport environmental samples directly to the laboratory within 24 hours of sample collection, or utilize an overnight delivery service within 24 hours of sample collection. All of the appropriate U.S. Department of Transportation (U.S.DOT) regulations for packaging, marking/labeling, and shipping hazardous materials and wastes will be followed. Air carriers that transport hazardous materials, in particular Federal Express, will comply with the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulations. The IATA regulations detail the procedures to be used to enable the proper shipment and transportation of hazardous materials by a common air carrier. Following all of the current IATA regulations will ensure compliance with U.S.DOT.

Additional information on sample handling and chain of custody requirements for DEP contract laboratories may be found in the DEP *Handbook for Use of Contract Laboratory Services,* (October 2004 or latest edition), and in the DEP *Guidance for Quality Assurance Project Plans for Contracted Services* (August 1990). Similar information pertaining to the DEP Bureau of Laboratories is found in the DEP *Bureau of Laboratories Quality Assurance Manual*, (October 2005 or latest edition).

B.3 Analytical Methods Requirements

Analytical methods will be selected that will achieve project objectives. Each site-specific SAP identifies the analytical methods for each parameter, the method number, the method detection limits and quantitation limits. Analytical methods should conform to those set forth in the *Closure Guidance,* the *Tank Regulations,* and the DEP *Land Recycling Program Technical Guidance Manual* (June 2002) as appropriate. Standard Operating Procedures (SOPs) for field screening methods and for non-EPA approved methods will be included in the site-specific SAP.

B.4 Quality Control Requirements

B.4.1 Field Quality Control

Field quality control (QC) samples will be collected to determine the quality of data generated from field sampling. Field QC samples include matrix blanks, equipment rinsate blanks, trip blanks, temperature blanks, and field duplicate samples. Field QC samples are prepared (i.e. labeled, packaged, preserved, and shipped to the assigned laboratory) identically to the primary field sample. The need for, and type and frequency of, field blanks depends on the project DQOs and is addressed in the site-specific SAP. The following is a discussion of the field QC samples that may be used.

Sample Matrix ("Field") Blank: The field blank is used primarily to determine whether contamination has been introduced during sample collection, storage and shipment, as well as sample handling in the analytical laboratory. Field blanks are prepared by transferring demonstrated analyte-free water to the appropriate sample containers during the time when site-specific samples are collected. These blanks are exposed to the same conditions as site-specific samples and analyzed for the same parameters.

Sampling Equipment/Rinsate Blank: The rinsate blank is used primarily to determine whether the sampling equipment decontamination procedure has been adequately performed, thereby assuring that no "carryover" contamination has been introduced before (or during) sample collection. Rinsate blanks are prepared in the field by pouring demonstrated analyte-free water through/over the sampling equipment and collecting rinsate in the appropriate sample containers. This sample is analyzed for the same parameters as those associated with site-specific samples collected from potentially contaminated media.

Trip Blank: The trip blank is used primarily to determine whether contamination has been introduced to aqueous samples through cross-contamination of volatile organic compound (VOCs) during shipment and storage of sample containers. Trip blanks, which are prepared prior to the sampling event and not exposed to field conditions, consist of certified analyte-free water in an appropriate container. Trip blanks are collected at a frequency of one per each cooler used to store/transport site-specific samples designated for VOC analyses.

Temperature Blank: The temperature blank is used only to determine whether site-specific samples have been adequately cooled during shipment and storage. Temperature blanks can be prepared any time before or during field sampling activities by adding water to the appropriate sample container. Temperature blanks are collected at a frequency of one per each cooler used to store/transport site-specific samples. The temperature of this sample is measured upon receipt by the analytical laboratory, but not analyzed.

Field Duplicates: Field duplicates are two samples collected at the same time from the same source at the same depth or sample location. The field duplicate and the original sample are submitted to the laboratory as blind, separate samples. The purpose of collecting duplicate samples is to assess the precision of the overall sampling effort, including collection, shipping, and laboratory analysis. One field duplicate sample of each medium is collected for every 10 primary samples. The duplicate is collected simultaneously from the same source and under identical conditions as the original sample and should remain "blind" to the laboratory to ensure indiscriminate handling.

B.4.2 Laboratory Quality Control

Laboratories that perform work under the State-lead Storage Tanks Corrective Action Program, including the DEP Bureau of Laboratories and DEP Contract Labs, must adhere to a written QA program. The laboratory QA manager is responsible for ensuring that all

internal laboratory QA checks are conducted in accordance with the laboratory's QA manual, its lab certification requirements, EPA approved analytical methods, the project specific QAPP, and any additional requirements included in the site-specific SAP. A copy of the QA Manual for the DEP Bureau of Laboratories is included as Appendix E. Laboratory QA manuals for the DEP contract laboratories may be obtained from the contract laboratories listed in Appendix A.

Laboratory QC samples include method blanks, laboratory control samples (LCSs), matrix spike/matrix spike duplicates (MS/MSDs) and surrogate spikes.

The specific types of QC samples and their required frequency of collection are addressed in the SAP; however, an explanation of the purpose of the laboratory QC samples is provided below.

Method Blanks: Also referred to as a "laboratory blank," a method blank is used to monitor the laboratory sample preparation and analysis procedures for interferences and contamination that may occur from glassware, reagents, sample manipulations and the laboratory environment. The method blank is an analyte-free matrix to which reagents are added in the same volume as used in the sample processing steps. It is taken through the entire sample preparation and analysis process.

Laboratory Control Samples (LCS): LCSs and LCS duplicates are laboratory-generated (spiked) samples of a known clean matrix (e.g., reagent-grade water, reagent sand) used to monitor the laboratory analytical process independent of matrix effects. LCSs measure laboratory performance with respect to accuracy and precision of the analytical process. LCS results, together with MSD results, can be used to establish the presence of matrix effects.

Matrix Spike Samples (MS): MS and MS duplicate samples measure matrix-specific method performance. An MS is prepared in the sample the same way as a LCS sample with the exception that an actual field sample is used as the matrix. Once the target analytes are spiked onto the matrix, the sample is extracted and analyzed in the same manner as the environmental sample. The accuracy of the analytical process for the spiked target analytes is determined by subtracting the native analyte concentrations from the overall recovered concentrations. Like the LCS, the duplicate samples can be used to calculate precision, in this case, matrix-specific precision.

Surrogate Spikes: Gas chromatography analyses include the addition of surrogate compounds, which are compounds that do not interfere with the analysis of the target analytes but are chemically similar to the target analytes and exhibit a similar response on the detector being used. Surrogates help monitor the performance of the analytical system and the effectiveness of the method for each sample matrix. Surrogates are added to every sample and QC sample at the beginning of the sample preparation (extraction) process.

B.5 Instrument/Equipment Maintenance Requirements

All field equipment will be maintained in accordance with each respective instrument manufacturer's operating instructions. All maintenance activities will be recorded in a logbook. The DEP contractor (for contracted activities) or DEP field staff will be responsible for performing operational checks on all field equipment prior to use in the field. An operational problem with any field instrumentation will be noted in the field notebook. Daily or regular calibration of field instrumentation will be according to applicable SOPs and manufacturer's instructions and indicated or referenced in the site-specific work plan. Fixed laboratory equipment used by contract laboratories or the DEP Bureau of Labs for quantitative sample analysis will be tested, inspected, calibrated and maintained according to the specific analytical equipment requirements as stated in the SOPs of the laboratory, in accordance with manufacturer-specified procedures or method-specified procedures, as appropriate. SOPs for the DEP Bureau of Labs are available upon request from the Laboratory QA Manager. SOPs for DEP contract labs are available from the contract labs listed in Appendix A.

B.6 Instrument Calibration and Frequency

The site-specific SAP lists all the project tools, gauges, instruments and other sampling, measuring, and test equipment that needs to be calibrated. The site-specific SAP describes the calibration method, identifies any certified equipment and/or standards to be used and provides a description of how calibration records are maintained and traceable to the specific instrument.

All field equipment is calibrated following the manufacturer procedures, instrument manuals, method-specified procedures and the laboratory SOPs, as appropriate. Instrument calibration instructions are included in the site-specific SAP, either directly in text or as an SOP attachment.

B.7 Data Management

A description of the project data management process—i.e., the standard record-keeping procedures, document control system and the approach used for data storage and retrieval on electronic media—is included in the site-specific SAP.

B.7.1.0 Sample Documentation

All sample documents shall be legibly written in ink. All corrections or revisions to sample documentation shall be made by lining through the original entry and initialing any changes. To reiterate these requirements, the following sub-sections are provided to outline sample documentation procedures that will be employed when conducting investigations and remedial activities.

B.7.1.1 Field Logbook

The field logbook is a descriptive notebook detailing site activities and observations so that an accurate and factual account of field procedures may be reconstructed. All entries will be signed by the individuals who made them. All field logbook entries will document the following specifics:

- Site or facility name and address.
- Names of personnel on site.
- Dates and times of all entries.
- Descriptions of all site activities, including site entry and exit times.
- Noteworthy events and discussions.
- Weather conditions.
- Site observations.
- Identification and description of samples and locations.
- Subcontractor information and names of onsite personnel.
- Dates and times of sample collections and chain of custody information.
- Records of photographs.
- Facility or site sketches.
- All relevant and appropriate information delineated in field data sheets and sample labels.

B.7.1.2 Standard Operating Procedures

Often many laboratory and field operations are arranged to form Standard Operating Procedures (SOPs). Whenever SOPs are applicable and available, they will be incorporated into the data collection activities pursuant to a CAP investigation or remedial activity. To ensure environmental sample collection efforts are comparable, procedures found in sampling SOPs will be followed. The appropriate sampling SOPs will be incorporated into the site-specific SAP as appendices or attachments. Site-specific SAPs will include SOPs for all field screening and non-EPA approved or modified methods.

B.7.1.3 Field Data Records

All real-time measurements and observations must always be recorded in project logbooks, field data records, or in similar types of record keeping books. Field data records will be organized into standard formats whenever possible, and retained in permanent files.

B.7.1.4 Analytical Data Deliverable Requirements

At a minimum, analytical data deliverable packages for screening and definitive data should include the following:

- Sample documentation (location, date and time of collection and analysis, etc.)
- Chain of custody
- Initial and continuing calibration
- Determination and documentation of detection limits
- Analyte(s) identification
- Analyte(s) quantitation
- QC blanks
- Quality Control sample results
- Duplicate results

Prior to the submission of laboratory data, the laboratory's Quality Assurance Officer should review the data for accuracy, precision and completeness.

B.7.1.5 Data Management

Laboratory data packages are prepared in hardcopy with summaries on diskette. The data packages and diskettes are retained with the project (site) files. The location and status of storage tank cleanups statewide are updated monthly in Excel Spreadsheet and pdf format and posted on the DEP website at www.dep.state.pa.us, keyword "Storage tank cleanup."

C. Assessment and Oversight

C.1 Performance and System Audits

Performance assessments are undertaken throughout data collection activities to evaluate the capability and performance of the measurement system.

The Chief of the Storage Tanks and Hazardous Sites Corrective Action Program or the ECP Manager may request the Chief of the Remedial Contracts Management Section to initiate performance assessments of contractors acting on behalf of the Storage Tanks Corrective Action Program. Laboratories will comply with all of the EPA and the National Environmental Laboratory Accreditation Conference (NELAC) requirements for laboratory QA programs. The laboratory Quality Assurance Manager will review data resulting from participation in this program and any problems will be addressed.

The number, type (e.g., announced or unannounced), and frequency of field audits will be specified in the site-specific SAP and depends on the intended use of the data, and the confidence needed and expected in the quality of the results. The SAP includes contingencies for adjusting the frequency of different types of field audits based on initial observations that suggest that more or fewer reviews are needed to meet the DQOs.

Corrective action requirements are implemented in response to deficiencies that are outside acceptance limits encountered during performance assessments. Any person who detects a deficiency or non-conforming situation is responsible for reporting the deficiency to the Regional Project Officer or Remedial Contractor Onsite Project Manager as appropriate.

C.2 Reports

The Regional Project Officer prepares and submits reports on assigned projects to the Regional Environmental Cleanup Manager at least quarterly. The Regional Environmental Cleanup Manager reports to the Storage Tanks and Hazardous Sites Corrective Action Section Chief regarding program activities on a quarterly basis.

D. Data Validation and Usability

Data verification is the process for evaluating the completeness, correctness and conformance/compliance of a specific data set against a method. Data validation is a

systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of its validity prior to its intended use.

D.1 Data Review Process

Primary data undergo a verification, validation and reconciliation with the original user requirements to determine their usability in making environmental decisions. The table below illustrates the steps in the data review process for the Storage Tanks Corrective Action Program.

	Primary Data	**Secondary Data**
Step 1	Data verification	Identify data that meet project needs
Step 2	Data validation	Evaluate data using project DQOs
Step 3	Reconciliation with user requirements	Document quality issues & limitations

Secondary data are evaluated relative to the data quality objectives and acceptance criteria of the project for which they will be used to determine if the data are appropriate to support a defensible conclusion. Secondary data is assessed for any limitations and how those limitations may impact the project and any conclusions or decisions based on the use of the secondary data.

Field data are reviewed by the contractor or the Regional Project Officer, as appropriate, and the usability of the data evaluated. Collection and analysis of field QA samples are essential for obtaining precise and accurate data that are representative of conditions. As control mechanisms, field quality control (QC) samples must be collected, stored, transported and analyzed in the same manner as the other samples. The laboratory should not know which samples are QC samples. The contractor or Regional Project Officer is responsible for ensuring that QC samples are collected and handled appropriately, following the guidelines as established in the EPA guidance, per Data Quality Objectives Process and related guidance. Field QC samples may include, but are not limited to:

- Field duplicates – estimate medium homogeneity and sampling precision
- Trip blanks – estimate bias
- Rinsate blanks – monitor decontamination procedures

D.2 Data Verification and Validation

To ensure that measurement data are of an appropriate quality, data should be verified and validated in accordance with the *Tank Regulations* and program requirements.

Data verification is generally performed before validation and may be completed by those who generated the data (e.g., by the laboratory, if it is analytical data). The focus of verification will be data performance against pre-determined specifications, such as SOPs be data performance against pre-determined specifications, such as SOPs, analytical methods or electronic operating systems.

Data validation is conducted on verified data by an independent party, when appropriate. Data validation requires that the techniques utilized be applied to the body of the data in a systematic and uniform manner. The process of data validation must be close to the origin of the data, independent of the data production, and objective in its approach. The data validator(s) are identified in the project-specific SAP.

Data validation will occur as described in the analytical SOPs for each parameter and the laboratory SOPs for data review. Data validation is accomplished using control charts and data review checklists. Discrepancies are noted in the analytical file and appropriate data flags are used. If data is determined to be outside of control limits, the data is flagged on the report of analysis.

The laboratory personnel will look at matrix spikes/matrix spike duplicates, lab blanks, and lab duplicates to ensure they are acceptable. The sample collector will compare the sample descriptions with the field sheets for consistency and ensure that any anomalies in the data are documented. The contractor or Regional Project Officer will perform a final review and approval to ensure that the data meets the quality objectives. This review and approval is a check on the reviews conducted by the laboratory to ensure consistency of ~~all~~ field and analytical data.

During data verification and validation, checks on data accuracy, precision and completeness are conducted, as appropriate. These checks are conducted as described in the following sections.

D.2.1 Accuracy

Accuracy is assessed through the analysis of quality control samples. The analytical accuracy is expressed as the percent recovery (%R) of an analyte that has been added to the environmental sample at a known concentration before analysis and is calculated according to the following equation:

$$\%\,R = 100 \times \{(S - U) / C_{sa}\}$$

Where:

% R = percent recovery
S = measured concentration in spiked aliquot
U = measured concentration in unspiked aliquot
C_{sa} = actual concentration of spike added

The following formula should be used for measurements where a standard reference material is used:

$$\%\,R = 100 \times \{C_m / C_{rm}\}$$

Where:

% R = percent recovery

C_m = measured concentration of standard reference material
C_{rm}= actual concentration of standard reference material

D.2.2 Precision

Precision is determined through the use of field duplicates, matrix spike/matrix spike duplicates and duplicate quality control samples. The Relative Percent Difference (RPD) between the two results is calculated and used as an indication of the precision of the analyses performed.

The following formula should be used to calculate precision:

$$RPD = \{(C_1 - C_2) / \{(C_1 + C_2)/ 2\}\} \times 100$$

Where:
RPD= relative percent difference
C_1= larger of the two observed values
C_2= smaller of the two observed values

D.2.3 Completeness

Completeness is defined as the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Data completeness is expressed as the percentage of valid data obtained from the measurement system. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria required by the prescribed analytical method. The project-specific SAP identifies any critical samples or triggers that would result in resampling.

The following formula should be used to calculate completeness:

$$\% C = 100 \times \{V / n\}$$

Where:
% C = percent completeness
V = number of measurements judged valid
n = total number of measurements necessary to achieve a specified statistical level of confidence in decision making.

D.3 Reconciliation with User Requirements

Data reconciliation is conducted to determine whether the validated data are usable for their original or modified intent. This process determines whether data quality objectives were achieved. Data reconciliation is the culmination of the data quality process and is generally completed just before reports are prepared to present the project results.

The following steps are used for data reconciliation with user requirements:

- Identification of user requirements in the project-specific SAP or QAPP.
- Specification of methods for determining whether anomalies or departures from assumptions were made when the project was planned.
- Procedures for how to reconcile or resolve the anomalies or departures and report any limitations on the usability of the data.

Systematic planning tools to assess data quality are used to develop methods for conducting the data reconciliation. One example of such a tool is the Data Quality Assessment process outlined in EPA's *Guidance for Data Quality Assessment: Practical Methods for Data Analysis* (EPA/600/R-96/084; July 2000). Additional guidance on data quality assessment may be found in the DEP *Guidance for Quality Review of Contract Laboratory Data Division A* (Oct. 1989), and the DEP *Guidance for Review of Division B Laboratory Data* (Dec. 1991).

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U.S. Environmental Protection Agency, January 2000. *Guidance on Technical Audits and Related Assessments for Environmental Data Operations (EPA QA/G-7).* EPA/600/R-99/080.

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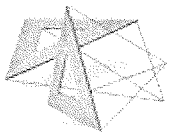


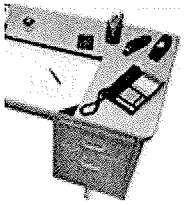
DavidM Friedman/R3/USEPA/US
08/29/2007 10:09 AM

To Thomas Uybarreta/R3/USEPA/US@EPA
cc
bcc
Subject Re: PA QAPP: Correction

Tom,

I have reviewed the PA QA Project Plan for their storage tank corrective action program. I have no comments on this revised plan.
I will return your copy of the plan shortly.

Dave
Thomas Uybarreta/R3/USEPA/US



Thomas Uybarreta/R3/USEPA/US
08/24/2007 01:43 PM

To DavidM Friedman/R3/USEPA/US@EPA
cc David Iacono/R3/USEPA/US@EPA
Subject PA QAPP: Correction

David

Sorry, I just realized you already have a copy of the PA QAPP sent to you on 7/25 by Carletta. Please feel free to send me comments on the PA QAPP if you have not already to Carletta before she left on 8/9. Please let me know if you have questions or if I have caused confusion.

Sorry again
Tom

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